Spot Safety Project Evaluation

Project Log # 200703112

Spot Safety Project # 08-95-203

Spot Safety Project Evaluation of the Traffic Signal and Left Turn Lane Installation at the Intersection of SR 1595 (Surrett Drive) and SR 1596 (Sealy Drive) Randolph County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ ___7-17-2007_____
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 08-95-203 – The Intersection of SR 1595 (Surrett Drive) and SR 1596 (Sealy Drive) in Randolph County near the Town of Trinity.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated traffic signal and construction of left turn lanes on the SR 1595 (Surrett Drive) approaches of the intersection. SR 1596 (Sealy Drive) intersects SR 1595 on the east side of this intersection with a private driveway to Rose Furniture Warehouse on the west side. In the before period, each leg provided a single lane approach with SR 1596 and the Warehouse PVA being under stop sign control. The speed limit for SR 1595 is posted at 45 mph while SR 1596 has a 35 mph posted speed limit.

The original statement of problem was the increasing difficulty for vehicles traveling southbound on SR 1595 to find sufficient gaps in traffic to safely conduct a left turn onto SR 1596. Due to the commercial development in the area, the side street entering volume is also increasing adding to the potential for a collision. The intersection met volume warrants 1, 9, and 11.

The initial crash analysis was completed from January 1, 1989 to January 31, 1998 with twelve (12) reported crashes. These crashes resulted in four "A" injuries, nine "B" injuries and two "C" class injuries. The predominant crash patterns during this period were rear-ends and left turns.

The final completion date for the improvement at the subject intersection was on July 25, 2002 with a total cost of $75,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1, 2002 to October 31, 2002. The before period consisted of reported crashes from March 1, 1998 through April 30, 2002 (4 years and 2 months) and the after period consisted of reported crashes from November 1, 2002 through December 31, 2006 (4 years and 2 months). The ending date for this analysis was determined by the available crash data at the time of its completion.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial photo, and site photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Rear-End and Frontal Impact Crashes were analyzed separately as target crashes for the applied countermeasure.

The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle. The Rear-End Crashes selected as target crashes were collisions that occurred on the approaches resulting from delay or traffic queuing due to a turning motorist.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	14	9	- 35.71 %
Total Severity Index	2.06	4.29	108.25 %
Frontal Impact Target Crashes	2	3	50.00 %
Frontal Impact Target Severity Index	1.00	5.93	493.00 %
Rear-End Target Crashes	9	4	- 55.55 %
Rear-End Target Severity Index	2.64	2.85	7.95 %
Volume	11,600	13,700	18.10 %
Injury Crash Summary			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	1	100.00 %
Class C Injury Crashes	2	3	50.00 %
Total Injury Crashes	2	4	100.00 %

The naive before and after analysis at the treatment location resulted in a 36 percent decrease in Total Crashes, a 55 percent decrease in Rear-end Crashes, and a 50 percent increase in Angle Collisions. The before period ADT year was 2000 and the after period ADT year was 2004.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 36 percent decrease in Total Crashes and a 36 percent decrease in overall Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagram*, a large portion of crashes at the intersection in the before period (11 of 14) were rear-end type collisions. The installation of left turn lanes on SR 1595 was successful in eliminating the three (3) rear-end crash pattern of vehicles waiting to turn left onto SR 1596 in the before period. Although, the pattern of rear-end crashes for SR 1596 right turning vehicles remains.

After the signal installation, angle crashes at the intersection increased by one although the severity nearly quadrupled. The before period consisted of two PDO collisions where the after period resulted in three crashes with one “B” injury and two “C” injuries. One injury crash in the after

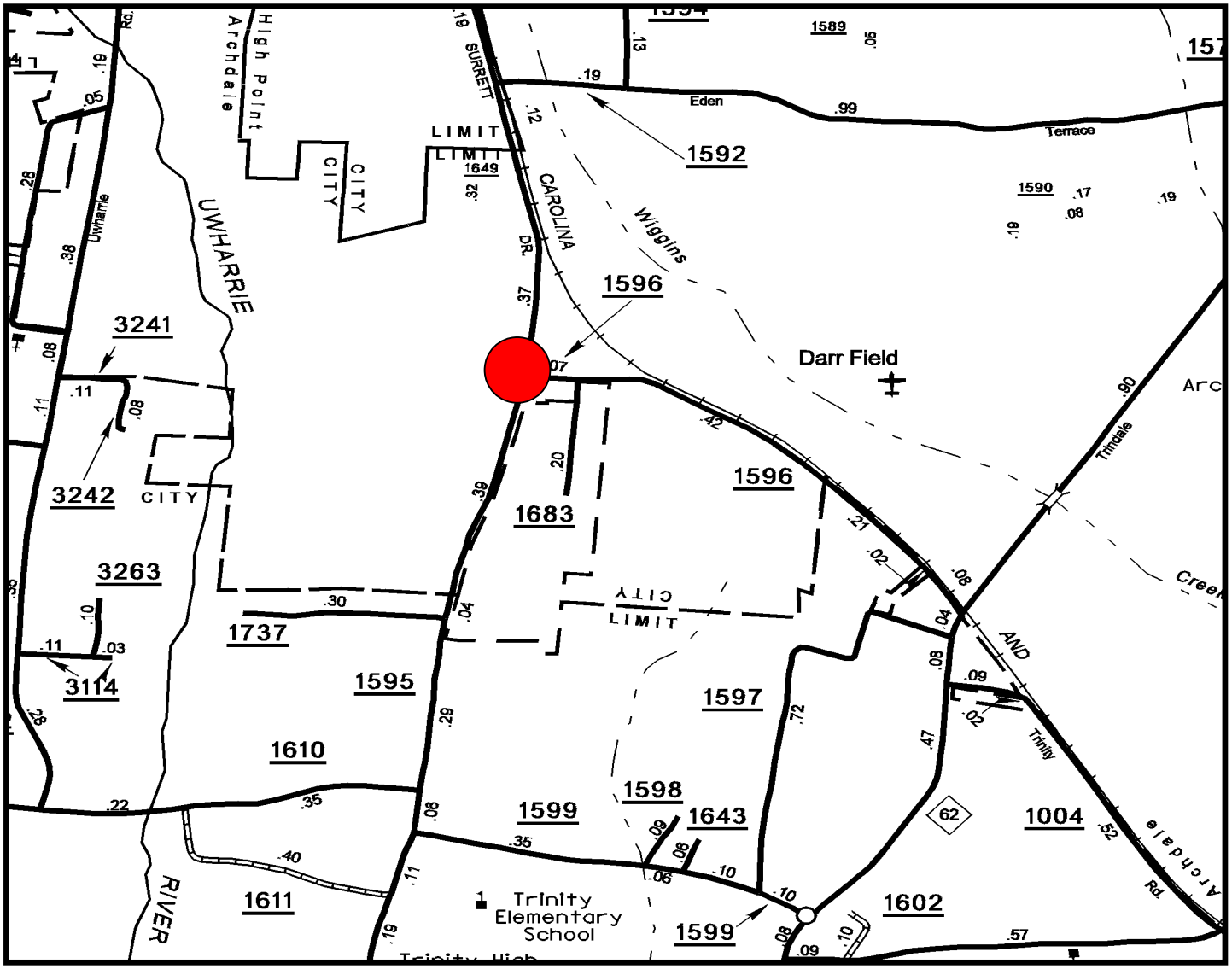
period resulted from a vehicle running a red light while the second was a permissive left turn type collision. With so few crashes to analyze, this does not appear to be the development of a pattern.

The calculated benefit to cost ratio for this project is -0.15 considering total crashes. The benefit to cost ratio considering only target crashes is 0.03. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs. The negative value shows that crash costs due to injury (Class B and Class C) crashes were higher in the after period.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection, including the entrance to the Rose Furniture Warehouse.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Randolph County
Evaluation of Spot Safety Project # 08-95-203



Treatment Location: SR 1595 (Surrett Drive) at SR 1596 (Sealy Drive)


Warehouse PVA
SR 1596
Sealy Drive
SR 1595
Surrett Drive
© 2007 Europa Technologies
Image © 2007 DigitalGlobe
Google
Pointer 35°54'31.20" N 79°59'51.88" W elev 860 ft Streaming 100%
Eye alt 1962 ft

TREATMENT SITE PHOTO TAKEN 7/2/2007

Traveling North on SR 1595 (Surrett Drive)

Traveling South on SR 1595 (Surrett Drive)

Traveling West on SR 1596 (Sealy Drive)

Traveling East on SR 1596 (Warehouse PVA)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1595 at SR 1596 | BY: JBS
COUNTY: Randolph | DATE: 7/5/2007
FILE NO.: SS 08-95-203 | NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - Signal and Left Turn Lanes on SR 1595

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$75,000	10	0.149	$11,177
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$75,000	10	0.149	$11,177

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $14,277
TOTAL COST OF PROJECT= $75,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.17	0	0.00	2	0.48	12	2.88	$19,856
AFTER	4.17	0	0.00	4	0.96	5	1.20	$21,942

Annual Benefits from Crash Cost Savings ($2,086)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($16,364)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.15

TOTAL COST OF PROJECT - $75,000 COMPREHENSIVE B/C RATIO - -0.15

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1595 at SR 1596 | BY: JBS
COUNTY: Randolph | DATE: 7/5/2007
FILE NO.: SS 08-95-203 | NOTES: Target Crashes (Both Together)

DETAILED COST: TYPE IMPROVEMENT - New Signal and Left Turn Lanes on SR 1595

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$75,000	10	0.149	$11,177
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$75,000	10	0.149	$11,177

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $14,277
TOTAL COST OF PROJECT= $75,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

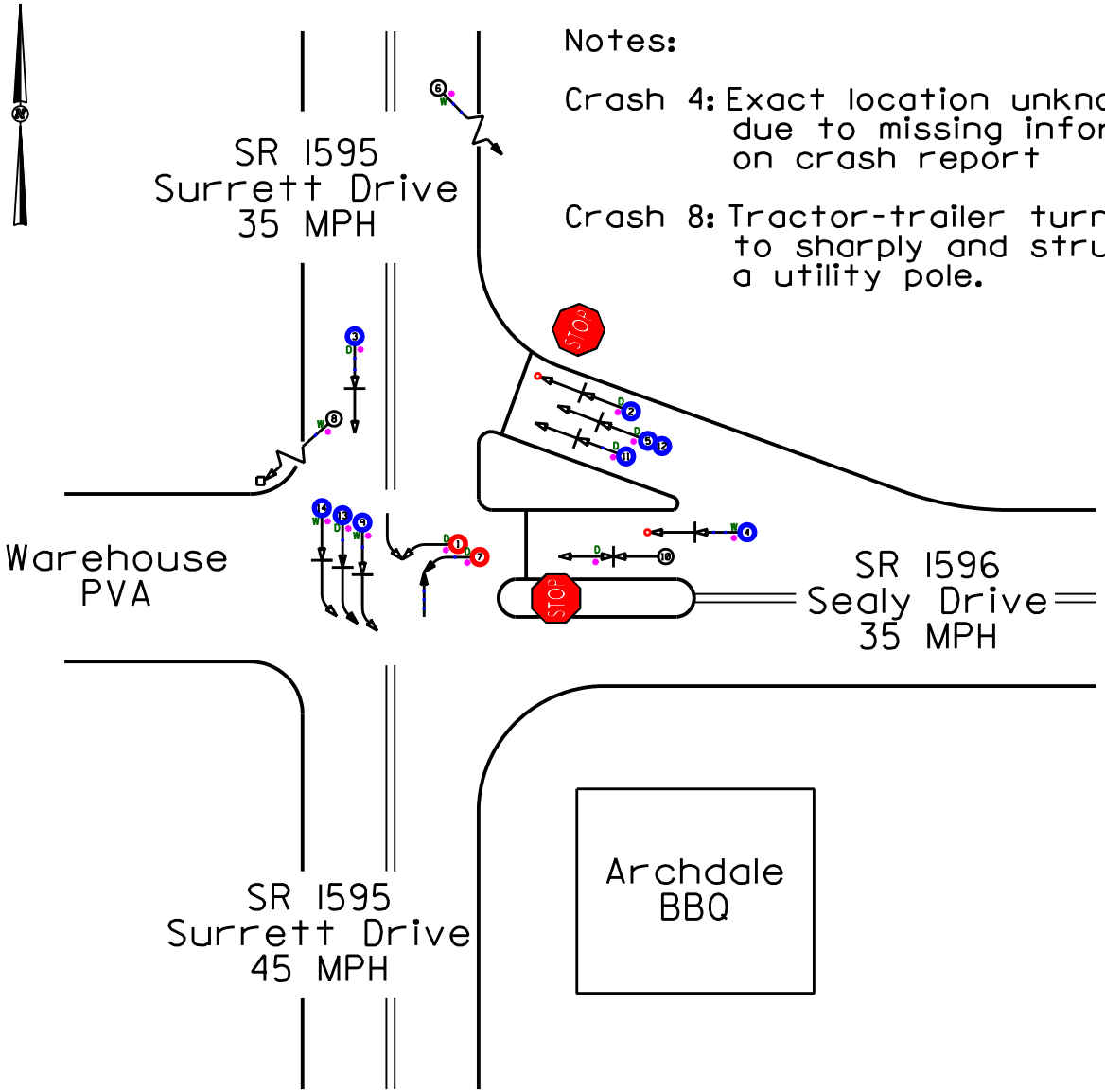
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.17	0	0.00	2	0.48	9	2.16	$17,050
AFTER	4.17	0	0.00	3	0.72	4	0.96	$16,691

Annual Benefits from Crash Cost Savings $360

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($13,917)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.03

TOTAL COST OF PROJECT - $75,000 COMPREHENSIVE B/C RATIO - 0.03



Notes:

Crash 4: Exact location unknown due to missing information on crash report

Crash 8: Tractor-trailer turned right to sharply and struck a utility pole.

LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD
ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY
9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN
P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OIL

SS# 08-95-203
Randolph County
Before Period
3/1/98 - 4/30/02
SR 1595 at SR 1596

(#) Rear-End Target Crashes

(#) Frontal Impact Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM

DIVISION: 8 AREA:

STUDY PERIOD: 3/1/1998 TO 4/30/2002

DISTANCE: Y-LINE + 150FT

ANALYSIS PREPARED BY: JBS

ANALYSIS CHECKED BY: BR

DIAGRAM PREPARED BY: JBS

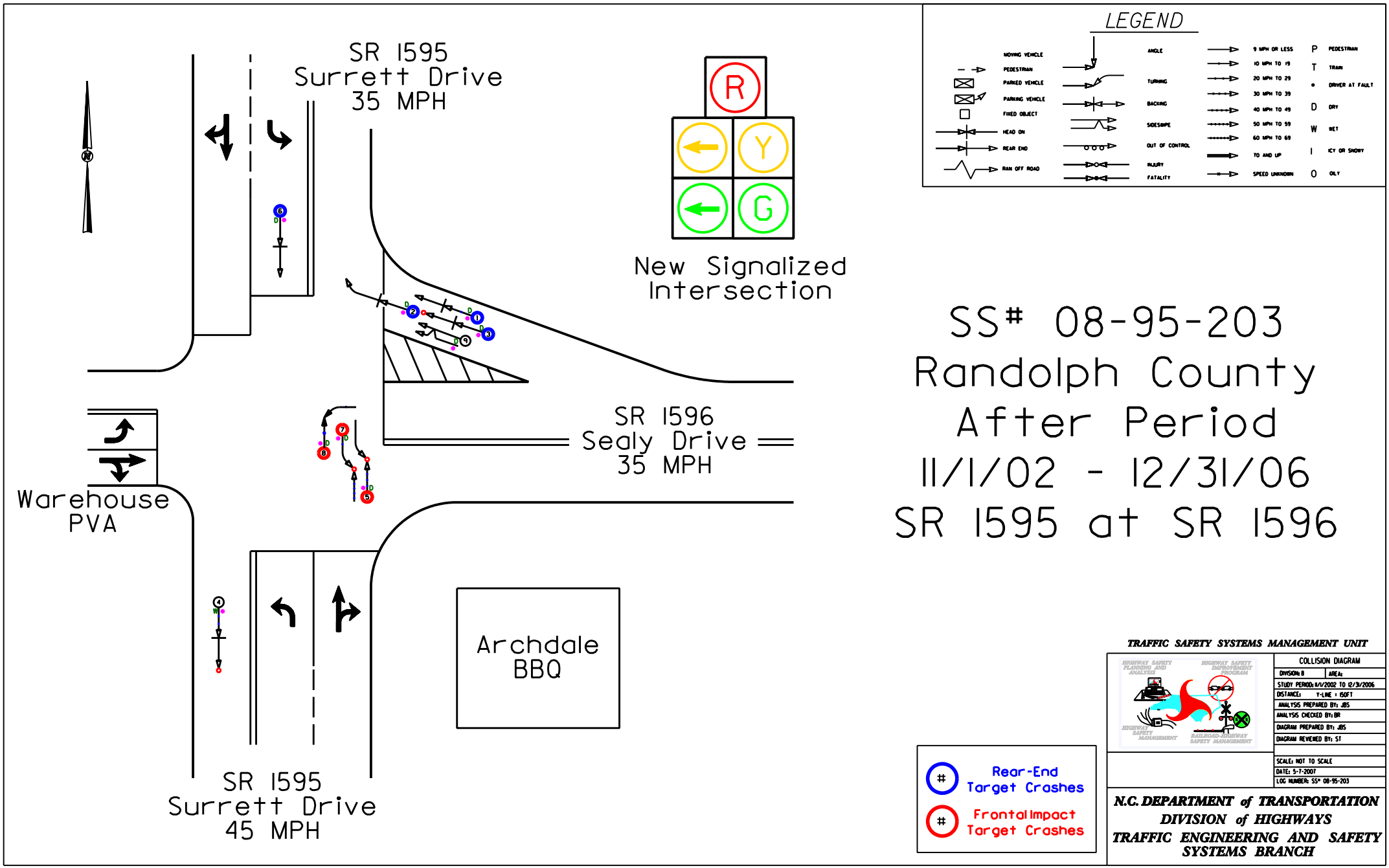
DIAGRAM REVIEWED BY: ST

SCALE: NOT TO SCALE

DATE: 5-7-2007

LOG NUMBER: SS# 08-95-203

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH


SR 1595
Surrett Drive
35 MPH
New Signalized Intersection
SR 1596
Sealy Drive
35 MPH
Warehouse
PVA
Archdale
BBQ
SR 1595
Surrett Drive
45 MPH
LEGEND
MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD
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* DRIVER AT FAULT
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W WET
I ICY OR SNOWY
O OIL
SS# 08-95-203
Randolph County
After Period
11/1/02 - 12/31/06
SR 1595 at SR 1596
Rear-End Target Crashes
Frontal Impact Target Crashes
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
DIVISION: 8
AREA:
STUDY PERIOD: 11/1/2002 TO 12/31/2006
DISTANCE: Y-LINE ± 150FT
ANALYSIS PREPARED BY: JBS
ANALYSIS CHECKED BY: BR
DIAGRAM PREPARED BY: JBS
DIAGRAM REVIEWED BY: ST
SCALE: NOT TO SCALE
DATE: 5-7-2007
LOG NUMBER: SS# 08-95-203
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH